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(54) Title: IMPROVED CHEWING GUM CONTAINING SUCROSE POLYESTERS (57) Abstract Improved chewing gum formulations and bases, as well as methods of producing chewing gum and bases are provided. The chewing gum includes sucrose polyesters. Sucrose polyesters can be used in the base and/or gum as a plasticizer, softener, and emulsifier. In an embodiment, sucrose polyesters are added to sucrose-type gum formulations replacing a small or large quantity of other fats, oils, and emulsifiers. A variety of base and chewing gum formulations including sucrose polyesters can be created and/or utilized pursuant to the present invention.		

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S P E C I F I C A T I O NTITLE**"IMPROVED CHEWING GUM CONTAINING
SUCROSE POLYESTERS"**

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BACKGROUND OF THE INVENTION

The present invention relates generally to chewing gum. More specifically, the present invention relates to improved formulations for chewing gum and bases.

10 Chewing gum generally consists of a water insoluble gum base and a water soluble portion along with flavors. The water soluble portion and flavors dissipate during chewing and the gum base is retained in the mouth throughout the chew.

15 The insoluble gum base generally comprises elastomers, resins, fats and oils, softeners, and inorganic fillers. Elastomers can include synthetic elastomers including polyisobutylene, isobutylene-isoprene copolymers, styrene-butadiene copolymers, polyvinyl acetate, polyisoprene, polyethylene, vinyl
20 acetate - vinyl laurate copolymers, and combinations thereof. Natural elastomers that can be used include natural rubber.

The gum base can include elastomer plasticizers. Such elastomer plasticizers can include natural rosin
25 esters, as well as other elastomer plasticizers. Additionally, the gum base can include fillers/texturizers and softeners/emulsifiers. Softeners are added to chewing gum in order to optimize the chewability and mouth feel of the gum.
30 Softeners/emulsifiers that are typically used include tallow, hydrogenated tallow, hydrogenated and partially hydrogenated vegetable oils, cocoa butter, glycerol

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monostearate, glycerol triacetate, lecithin, and combinations thereof.

In addition to a water insoluble gum base portion, a typical chewing gum composition includes a water soluble portion and one or more flavoring agents. The water soluble portion can include bulk sweeteners, high intensity sweeteners, flavoring agents, softeners, emulsifiers, colors, acidulants, fillers, antioxidants, and other components that provide desirable attributes.

SUMMARY OF THE INVENTION

The present invention provides improved chewing gum formulations and bases, as well as methods of producing chewing gum and bases. Pursuant to the present invention, chewing gum is provided that includes sucrose polyesters (SPEs). Sucrose polyesters are used in the base and/or gum formulations as plasticizers, softeners, and/or emulsifiers. In an embodiment, sucrose polyesters are added to sucrose-type gum formulations replacing a small or large quantity of other fats, oils, emulsifiers, and softeners.

A variety of base and chewing gum formulations including sucrose polyesters can be created and/or utilized pursuant to the present invention. The base formulations of the present invention may be conventional bases that include wax or are wax-free, tacky or non-tacky and/or bubble gum-type bases. The gum formulations can be low or high moisture formulations containing low or high amounts of moisture-containing syrup. Sucrose polyesters can also be used in low sugar and non-sugar containing gum formulations made with sorbitol, mannitol, other polyols, and non-sugar carbohydrates. Non-sugar

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formulations can include low or high moisture sugar-free chewing gums.

5 In an embodiment, sucrose polyesters are used as a softener and are combined with other base softeners for use in chewing gum base. Such other softeners include, but are not limited to, fats and oils, such as tallow, hydrogenated and partially hydrogenated vegetable oils, cocoa butter, mono- and di-glycerides, acetylated monoglycerides, softeners such as glycerol triacetate, 10 waxes such as paraffin and microcrystalline waxes, and emulsifiers such as lecithin.

15 In an embodiment, the sucrose polyesters are used as a softener in chewing gum formulations to replace typical chewing gum softeners. In an embodiment, sucrose polyesters are used in the chewing gum formulation to replace typical plasticizers and emulsifying agents that are used in chewing gum formulations. For example, sucrose polyesters can be used to replace glycerin, lecithin, glycerol triacetate, acetylated monoglycerides, 20 and mono- and di-glycerides.

25 In an embodiment, the sucrose polyesters softeners are used in a chewing gum formulation combined with other softeners, emulsifiers, and plasticizing agents. If desired, the sucrose polyesters can be used alone or combined with an inert material which may be added in a dry form. The sucrose polyesters softener can also be melted and added to the flavor as a carrier for its use in chewing gum.

30 The sucrose polyesters softener, when used according to the present invention, affords the chewing gum an improved texture, improved shelf life, and improved flavor quality. Even though sucrose polyesters are similar to other fats and oils in some respects, sucrose

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polyesters have significant softening effects that create a resultant chewing gum product that has a high consumer-acceptability.

5 In an embodiment, the present invention provides a gum base comprising an elastomer and at least 0.02% by weight of sucrose polyesters.

10 In an embodiment, the present invention provides a chewing gum formulation comprising an insoluble gum base, a water soluble portion, a flavor, and at least 0.01% by weight of sucrose polyesters.

It is an advantage of the present invention to provide an improved chewing gum formulation.

15 A further advantage of the present invention is to provide an improved base that can be used to create chewing gum.

Another advantage of the present invention is that it provides an improved chewing gum softener.

Still further, an advantage of the present invention is that it provides an improved chewing gum plasticizer.

20 Additionally, an advantage of the present invention is that it provides an improved emulsifying agent for chewing gum.

25 Moreover, an advantage of the present invention is that it provides an improved method for creating chewing gum.

Furthermore, an advantage of the present invention is that it provides a chewing gum having improved texture.

30 An advantage of the present invention is that it provides a chewing gum having an improved shelf life.

Still further, an advantage of the present invention is that it provides a chewing gum having improved flavor quality.

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Additional features and advantages of the present invention are described in, and will be apparent from, the detailed description of the presently preferred embodiments.

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DETAILED DESCRIPTION
OF THE PRESENTLY PREFERRED EMBODIMENTS

10 The present invention provides improved chewing gum formulations and base formulations. Pursuant to the present invention, sucrose polyesters are used. The sucrose polyester can be used in chewing gum formulations and/or bases. Specifically, the sucrose polyesters can be used as a softener, plasticizer, and/or emulsifying agent.

15 Sucrose esters include sucrose polyesters and sucrose fatty acid esters. Sucrose esters are a group of components synthesized by esterification of fatty acids from natural triglycerides and sucrose. The esters have a structure typical of surfactants containing both
20 polar and non-polar groups on the same molecule. Since sucrose has a total of eight hydroxyl groups, three are primary and five are secondary, compounds ranging from sucrose mono- to octa- fatty acids esters can be produced. Although fatty acids in the C₈ to C₂₂ range are
25 suitable to esterify sucrose, long chain fatty acids of C₁₄ to C₁₈ are preferred. Such long chain fatty acids include sucrose laurate, sucrose palmitate, sucrose stearate and sucrose oleate.

30 Sucrose esters that have one, two or three fatty acids, or mono, di, and triesters, are referred to as sucrose fatty acid esters (SFAEs). Other sucrose esters that have four or more, up to eight fatty acids esters, are referred to as sucrose polyesters (SPEs). Sucrose

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fatty acid esters with toxicological clearance have been approved for specific uses in the United States since 1983.

5. The materials approved for food use are mixtures of mono-, di-, and triesters of palmitic and stearic acids. FDA and EC (European Community) standards require a minimum of 80% total content of mono-, di-, and triester to be food approved. Sucrose polyesters with four or more fatty acids are not approved for food use in the United States or EC.

10 The classic way to characterize sucrose fatty acid esters is by hydrophilic-lipophilic balance (HLB). The HLB of sucrose fatty acid esters can range from approximately 2 to about 18.

15 Sucrose fatty acid esters that have a high HLB are more hydrophilic, and those with a low HLB are lipophilic. Generally, sucrose fatty acid esters with more hydroxyl groups and fewer fatty acids are more hydrophilic such as mono esters. Sucrose fatty acid esters that are esterified with more fatty acids are more lipophilic with a low HLB. Sucrose polyesters with 4 or more fatty acids are very lipophilic with an HLB of about 1.

25 Sucrose polyesters have very similar properties to fats and oils, but are non-digestible. A sucrose polyester called Olestra is currently being developed as a fat substitute by Proctor and Gamble. The inventors believe that the original patent for Olestra is U.S. Patent No. 3,600,186. Olestra contains mostly hexa-, hepta- and octa- esters of fatty acids. Sucrose polyesters are made by the reaction of sucrose octoacetate (SOAC) and the methyl ester of the fatty acid (FAME) to obtain the sucrose octa fatty acid polyester.

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Such fatty acids could be sucrose octapalmitate, sucrose octostearate, or sucrose octooleate.

Other sucrose polyesters are available that may also have 4, 5, 6 or 7 fatty acids esterified on the sucrose molecule or these may be a blend of sucrose polyesters. Some of these sucrose polyesters may be available as DK Esters from Dai-Ichi Kogyo Seiyaku Co., Ltd., of Japan through Montello Co. of Tulsa, Oklahoma. Also some sucrose polyesters may be available from Mitsubishi Kasei Food Corp. of Tokyo, Japan as Ryoto Sugar Esters. These materials although not food approved, would have better emulsifying properties than the sucrose octoesters.

Pursuant to the present invention, sucrose polyesters can be used in base formulations and/or chewing gum formulations. In this regard, the sucrose polyesters can be used as softeners, plasticizers, and/or emulsifying agents. The sucrose polyesters can be used in a variety of different chewing gum and base formulations.

As previously noted, chewing gum generally consists of a water insoluble gum base, a water soluble portion, and flavors.

The insoluble gum base generally comprises elastomers, resins, fats and oils, softeners, and inorganic fillers. The gum base may or may not include wax. The insoluble gum base can constitute approximately 5 to about 95 percent, by weight, of the chewing gum, more commonly, the gum base comprises 10 to about 50 percent of the gum, and in some preferred embodiments, 20 to about 35 percent, by weight, of the chewing gum.

In an embodiment, the chewing gum base of the present invention contains about 20 to about 60 weight percent synthetic elastomer, 0 to about 30 weight percent

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5 natural elastomer, about 5 to about 55 weight percent elastomer plasticizer, about 4 to about 35 weight percent filler, about 5 to about 35 weight percent softener, and optional minor amounts (about one percent or less) of miscellaneous ingredients such as colorants, antioxidants, etc.

10 Synthetic elastomers may include, but are not limited to, polyisobutylene with a GPC weight average molecular weight of about 10,000 to about 95,000, isobutylene-isoprene copolymer (butyl elastomer), styrene-butadiene copolymers having styrene-butadiene ratios of about 1:3 to about 3:1, polyvinyl acetate having a GPC weight average molecular weight of about 2,000 to about 90,000, polyisoprene, polyethylene, vinyl acetate-vinyl laurate copolymer having vinyl laurate content of about 5 to about 50 percent by weight of the copolymer, and combinations thereof.

15 Preferred ranges are, for polyisobutylene, 50,000 to 80,000 GPC weight average molecular weight, for styrene-butadiene, 1:1 to 1:3 bound styrene-butadiene, for polyvinyl acetate, 10,000 to 65,000 GPC weight average molecular weight with the higher molecular weight polyvinyl acetates typically used in bubble gum base, and for vinyl acetate-vinyl laurate, vinyl laurate content of 10-45 percent.

20 Natural elastomers may include natural rubber such as smoked or liquid latex and guayule as well as natural gums such as jelutong, lechi caspi, perillo, sorva, massaranduba balata, massaranduba chocolate, nispero, rosindinha, chicle, gutta hang kang, and combinations thereof. The preferred synthetic elastomer and natural elastomer concentrations vary depending on whether the chewing gum in which the base is used is adhesive or

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conventional, bubble gum or regular gum, as discussed below. Preferred natural elastomers include jelutong, chicle, sorva and massaranduba balata.

5 Elastomer plasticizers may include, but are not limited to, natural rosin esters, often called estergums, such as glycerol esters of partially hydrogenated rosin, glycerol esters polymerized rosin, glycerol esters of partially dimerized rosin, glycerol esters of rosin, pentaerythritol esters of partially hydrogenated rosin, 10 methyl and partially hydrogenated methyl esters of rosin, pentaerythritol esters of rosin; synthetics such as terpene resins derived from alpha-pinene, beta-pinene, and/or d-limonene; and any suitable combinations of the foregoing. the preferred elastomer plasticizers will 15 also vary depending on the specific application, and on the type of elastomer which is used.

Fillers/texturizers may include magnesium and calcium carbonate, ground limestone, silicate types such as magnesium and aluminum silicate, clay, alumina, talc, 20 titanium oxide, mono-, di- and tri-calcium phosphate, cellulose polymers, such as wood, and combinations thereof.

In an embodiment, in addition to the sucrose polyesters, pursuant to the present invention, 25 softeners/emulsifiers may include tallow, hydrogenated tallow, hydrogenated and partially hydrogenated vegetable oils, cocoa butter, glycerol monostearate, glycerol triacetate, lecithin, mono-, di- and triglycerides, acetylated monoglycerides, fatty acids (e.g. stearic, 30 palmitic, oleic and linoleic acids), and combinations thereof.

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Colorants and whiteners may include FD&C-type dyes and lakes, fruit and vegetable extracts, titanium dioxide, and combinations thereof.

5 The base may or may not include wax. Waxes may include synthetic waxes such as microcrystalline or paraffin waxes, or natural waxes such as carnauba, beeswax, candellila, or polyethylene wax. An example of a wax-free gum base is disclosed in U.S. Patent No. 5,286,500, the disclosure of which is incorporated herein
10 by reference.

 In addition to a water insoluble gum base portion, a typical chewing gum composition includes a water soluble bulk portion and one or more flavoring agents. The water soluble portion can include bulk sweeteners,
15 high intensity sweeteners, flavoring agents, softeners, emulsifiers, colors, acidulants, fillers, antioxidants, and other components that provide desired attributes.

 The softeners, which are also known as plasticizers and plasticizing agents, generally constitute between
20 approximately 0.5 to about 15% by weight of the chewing gum. The softeners may, in addition to including sucrose polyesters, include glycerin, lecithin, and combinations thereof. Aqueous sweetener solutions such as those containing sorbitol, hydrogenated starch hydrolysates,
25 corn syrup and combinations thereof, may also be used as softeners and binding agents in chewing gum.

 Bulk sweeteners include both sugar and sugarless components. Bulk sweeteners typically constitute 5 to about 95% by weight of the chewing gum, more typically,
30 20 to 80% by weight, and more commonly, 30 to 60% by weight of the gum.

 Sugar sweeteners generally include saccharide-containing components commonly known in the chewing gum

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art, including, but not limited to, sucrose, dextrose, maltose, dextrin, dried invert sugar, fructose, levulose, galactose, corn syrup solids, and the like, alone or in combination.

5 Sorbitol can be used as a sugarless sweetener. Additionally, sugarless sweeteners can include, but are not limited to, other sugar alcohols such as mannitol, xylitol, hydrogenated starch hydrolysates, maltitol, and the like, alone or in combination.

10 High intensity artificial sweeteners can also be used in combination with the above. Preferred sweeteners include, but are not limited to sucralose, aspartame, salts of acesulfame, alitame, saccharin and its salts, cyclamic acid and its salts, glycyrrhizin,
15 dihydrochalcones, thaumatin, monellin, and the like, alone or in combination. In order to provide longer lasting sweetness and flavor perception, it may be desirable to encapsulate or otherwise control the release of at least a portion of the artificial sweetener. Such
20 techniques as wet granulation, wax granulation, spray drying, spray chilling, fluid bed coating, coacervation, and fiber extrusion may be used to achieve the desired release characteristics.

 Usage level of the artificial sweetener will vary
25 greatly and will depend on such factors as potency of the sweetener, rate of release, desired sweetness of the product, level and type of flavor used and cost considerations. Thus, the active level of artificial sweetener may vary from 0.02 to about 8%. When carriers
30 used for encapsulation are included, the usage level of the encapsulated sweetener will be proportionately higher.

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Combinations of sugar and/or sugarless sweeteners may be used in chewing gum. Additionally, the softener may also provide additional sweetness such as with aqueous sugar or alditol solutions.

5 If a low calorie gum is desired, a low caloric bulking agent can be used. Example of low caloric bulking agents include: polydextrose; Raftilose, Raftilin; Fructooligosaccharides (NutraFlora); Palatinose oligosaccharide; Guar Gum Hydrolysate (Sun Fiber); or
10 indigestible dextrin (Fibersol). However, other low calorie bulking agents can be used.

A variety of flavoring agents can be used. The flavor can be used in amounts of approximately 0.1 to about 15 weight percent of the gum, and preferably, about
15 0.2 to about 5%. Flavoring agents may include essential oils, synthetic flavors or mixtures thereof including, but not limited to, oils derived from plants and fruits such as citrus oils, fruit essences, peppermint oil, spearmint oil, other mint oils, clove oil, oil of
20 wintergreen, anise and the like. Artificial flavoring agents and components may also be used. Natural and artificial flavoring agents may be combined in any sensorially acceptable fashion.

25 The present invention, it is believed, can be used with a variety of processes for manufacturing chewing gum.

Chewing gum is generally manufactured by sequentially adding the various chewing gum ingredients to commercially available mixers known in the art. After
30 the ingredients have been thoroughly mixed, the chewing gum mass is discharged from the mixer and shaped into the desired form, such as by rolling into sheets and cutting

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into sticks, extruding into chunks, or casting into pellets.

Generally, the ingredients are mixed by first melting the gum base and adding it to the running mixer. The gum base may alternatively be melted in the mixer. Color and emulsifiers can be added at this time.

A chewing gum softener such as glycerin can be added next along with part of the bulk portion. Further parts of the bulk portion may then be added to the mixer. Flavoring agents are typically added with the final part of the bulk portion. The entire mixing process typically takes from five to fifteen minutes, although longer mixing times are sometimes required.

Sucrose polyesters in its molten or solid form may be added to chewing gum during manufacture of the base. Sucrose polyesters may be added at any time during processing of the base, but preferably, near the end of the batch to act as a softener.

Sucrose polyesters may be added to conventional bases that contain wax or are wax-free bases, that may or may not contain polyvinyl acetate or terpene resins, or bases that contain natural gums or synthetic bases, bases that are non-tacky, or are bubble gum bases.

At levels of approximately 0.02% to about 40% by weight of the gum base, sucrose polyesters may replace some or most of the partially hydrogenated or hydrogenated vegetable oils, mono- and di-glycerides, acetylated monoglycerides, or other softeners used in the gum base. Sucrose polyesters may also be blended with the other softeners in the gum base and added during the base manufacturing process. A chewing gum base made with some sucrose polyesters will have greater oxidative stability due to the presence of sucrose polyesters, and

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will give chewing gum a cleaner taste due to a reduction of off-tasting fats and oils.

5 Sucrose polyesters may also be added to a chewing gum formulation in its molten or solid form or may be mixed with other gum or base softeners and added to a gum formulation during processing. Sucrose polyesters may be added during the gum manufacturing at any time during processing, but preferably, early in the batch to allow thorough mixing with the gum base.

10 Sucrose polyesters can be added to the chewing gum formulation so that they comprise approximately 0.01% to about 5% by weight of the chewing gum formulation. In a preferred embodiment, the sucrose polyesters comprise approximately 0.02% to about 2% and most preferably, 15 about 0.05% to about 0.5% by weight of the chewing gum formulation. Sucrose polyesters may be blended with other softeners such as lecithin, glycerol triacetate, acetylated monoglycerides, mono- and di-glycerides, or other vegetable oils and fats that may be added to a gum 20 formulation. When another softener is used, such as lecithin, sucrose polyesters may act as a carrier or solvent for the particulate lecithin. Lecithin when mixed with molten sucrose polyesters may allow for an easier dispersion of lecithin in a gum formulation. This 25 should be contrasted with soy bean oil that is typically used as a carrier for lecithin.

 Sucrose polyesters may also be blended with a wide range of natural and artificial flavor oils and act as a carrier for flavor oils. Some sucrose polyesters are 30 dispersible with/or dissolved in flavors such as spearmint, peppermint, cinnamon, wintergreen, and fruit flavors. The level of sucrose polyesters mixed with flavors can vary over a wide range from approximately 1%

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to about 99% by weight since most gum flavors are oil soluble.

5 Sucrose polyesters can also act as a carrier for artificial and natural colors such as in FD&C lake dispersions and natural colors like betacarotene. Some sucrose polyesters may eliminate the off-taste associated with fat/oil carriers and allows higher usage of color.

10 Some sucrose polyesters may also be used as a release agent for encapsulated flavors. Some sucrose polyesters can be added to an encapsulating media to allow for faster and easier dissolution of the encapsulating media.

15 Some sucrose polyesters, also known as emulsifiers, have higher HLB values and may be effective as a surface active agent. Thus, sucrose polyesters can be mixed with the flavor and carrier to provide an easier encapsulation of flavors.

20 The use of sucrose polyester in chewing gum has a unique benefit not found in other types of food products. The chewing gum bolus is not ingested, but discarded, and is generally very lipophilic. Fat, oils, some emulsifiers, and softeners of the gum base remain in the gum bolus and are therefore not ingested, but discarded. As a result, sucrose polyesters which are very lipophilic
25 may be used in chewing gum base, remain in the gum bolus, and be discarded with the gum bolus. In most foods, sucrose polyester is ingested, but because of its structure is not digestible, and therefore causes a problem called "anal leakage." However, in chewing gum,
30 the gum bolus containing sucrose polyester is discarded and not ingested, and therefore may be used in chewing gum without causing the "anal leakage" problem.

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By way of example, and not limitation, examples of the present invention will now be given:

EXAMPLES

5 The following contemplative examples of the invention and comparative examples are provided by way of explanation and illustration and not limitation.

10 The formulas listed in Table I comprise various contemplative sugar formulas in which sucrose polyesters (SPE) can be added at various levels to gum. Sucrose polyesters may be any sucrose ester having 4 or more fatty acid ester units, and preferably 8 fatty acid units such as Olestra.

TABLE 1
(WEIGHT PERCENT)

15		<u>Ex. 1</u>	<u>Ex. 2</u>	<u>Ex. 3</u>	<u>Ex. 4</u>	<u>Ex. 5</u>	<u>Ex. 6</u>
	Sugar	61.55	61.5	61.35	62.5	62.0	61.0
	Base	19.2	19.2	19.2	19.2	19.2	19.2
	Corn Syrup	16.9	16.9	16.9	16.9	16.9	16.9
	Peppermint						
20	Flavor	0.9	0.9	0.9	0.9	0.9	0.9
	Glycerin	1.4	1.4	1.4	0.0	0.0	0.0
	SPEs	0.05	0.10	0.25	0.50	1.0	2.0

In Table 2, dextrose monohydrate is added to a sugar formula with various levels of sucrose polyesters.

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TABLE 2

		<u>Ex. 7</u>	<u>Ex. 8</u>	<u>Ex. 9</u>	<u>Ex. 10</u>	<u>Ex. 11</u>	<u>Ex. 12</u>
5	Sugar	55.65	55.6	55.45	56.2	55.7	54.7
	Base	19.2	19.2	19.2	19.2	19.2	19.2
	Corn Syrup	12.9	12.9	12.9	12.9	12.9	12.9
	Glycerin	1.4	1.4	1.4	0.4	0.4	0.4
	Dextrose						
10	Monohydrate	9.9	9.9	9.9	9.9	9.9	9.9
	Peppermint						
	Flavor	0.9	0.9	0.09	0.9	0.9	0.9
	SPEs	0.05	0.10	0.25	0.50	1.0	2.0

Examples 13-18 are the same as Examples 7-12 except that sucrose polyesters are pre-blended with the peppermint flavor and added to the gum formulation.

15 The following Tables 4 through 11 give examples of gum formulations demonstrating formula variations in which sucrose polyesters in a molten form or solid, can be used.

20 Examples 19-23 in Table 4 demonstrate the use of PGE in low-moisture sugar formulations having less than 2% theoretical moisture:

TABLE 4

		<u>Ex. 19</u>	<u>Ex. 20</u>	<u>Ex. 21</u>	<u>Ex. 22</u>	<u>Ex. 23</u>
25	Sugar	58.75	58.6	58.3	52.7	51.9
	Gum Base	19.2	19.2	19.2	19.2	19.2
	Corn Syrup ^a	6.0	6.0	6.0	6.0	6.0
	D e x t r o s e					
30	Monohydrate	10.0	10.0	10.0	10.0	10.0
	Lactose	0.0	0.0	0.0	5.0	5.0
	Glycerin ^b	5.0	5.0	5.0	5.0	5.0
	Flavor	0.9	0.9	0.9 ^d	0.9 ^d	0.9 ^d
	Lecithin ^c	0.1	0.1	0.1	0.2	---

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SPEs 0.05 0.2 0.5^d 1.0^d 2.0^d

^aCorn syrup is evaporated to 85% solids, 15% moisture.

^bGlycerin and syrup can be blended and co-evaporated.

^cLecithin and SPEs can be pre-blended.

5 ^dFlavor and SPEs can be pre-blended.

Examples 24-28 in Table 5 demonstrate the use of sucrose polyesters in medium-moisture sugar formulations having about 2% to about 5% moisture.

TABLE 5

10		<u>Ex. 24</u>	<u>Ex. 25</u>	<u>Ex. 26</u>	<u>Ex. 27</u>	<u>Ex. 28</u>
	Sugar	53.35	53.2	52.9	52.3	51.5
	Gum Base	19.2	19.2	19.2	19.2	19.2
	Corn Syrup ^a	15.0	15.0	15.0	15.0	15.0
	Dextrose					
15	Monohydrate	10.0	10.0	10.0	10.0	10.0
	Glycerin ^b	1.4	1.4	1.4	1.4	1.4
	Flavor	0.9 ^d	0.9 ^d	0.9 ^d	0.9 ^d	0.9 ^d
	Lecithin ^c	0.1	0.1	0.1	0.2	—
	SPEs	0.05 ^d	0.2 ^d	0.5 ^d	1.0 ^d	2.0 ^d

20 ^aCorn syrup is evaporated to 85% solids, 15% moisture.

^bGlycerin and syrup can be blended and co-evaporated.

^cSPEs and Lecithin can be pre-blended.

^dFlavor and SPEs can be pre-blended.

25 Examples 29-33 in Table 6 demonstrate the use of sucrose polyesters in high moisture sugar formulations having more than about 5% moisture.

TABLE 6

30		<u>Ex. 29</u>	<u>Ex. 30</u>	<u>Ex. 31</u>	<u>Ex. 32</u>	<u>Ex. 33</u>
	Sugar	50.95	50.7	50.4	48.9	48.0
	Gum Base	24.0	24.0	24.0	24.0	24.0
	Corn Syrup	24.0	24.0	24.0	24.6	24.6
	Glycerin	0.0	0.0	0.0	0.4	0.4

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Flavor	1.0	1.0	1.0	1.0	1.0
Lecithin*	---	0.1	0.1	0.1	—
SPEs	0.05	0.2	0.5	1.0	2.0

*Lecithin and SPEs can be pre-blended.

5 Examples 34-38 in Table 7 and Examples 39-48 in
 Tables 8 and 9 demonstrate the use of sucrose polyesters
 in low- and high-moisture gums that are sugar-free. Low-
 moisture gums have less than about 2% moisture, and high-
 moisture gums have greater than 2% moisture.

10

TABLE 7

	<u>Ex. 34</u>	<u>Ex. 35</u>	<u>Ex. 36</u>	<u>Ex. 37</u>	<u>Ex. 38</u>
Base	25.5	25.5	25.5	25.5	25.5
Sorbitol	50.85	50.7	50.5	50.0	48.0
Mannitol	12.0	12.0	12.0	12.0	13.0
15 Glycerin	10.0	10.0	10.0	10.0	10.0
Flavor	1.5	1.5	1.5	1.5	1.5
Lecithin*	0.1	0.1	---	---	---
SPEs	0.05	0.2	0.5	1.0	2.0

*Lecithin and SPEs can be pre-blended.

20

**Flavor and SPEs can be pre-blended.

TABLE 8

	<u>Ex. 39</u>	<u>Ex. 40</u>	<u>Ex. 41</u>	<u>Ex. 42</u>	<u>Ex. 43</u>
Base	25.5	25.5	25.5	25.5	25.5
Sorbitol	50.95	50.8	50.5	51.9	49.8
25 Sorbitol					
Liquid*	10.0	10.0	10.0	10.0	11.0
Mannitol	10.0	10.0	10.0	10.0	10.0
Glycerin	2.0	2.0	2.0	0.0	0.0
Flavor	1.5	1.5	1.5	1.5	1.5
30 Lecithin**	---	---	---	0.1	0.2
SPEs	0.05	0.2	0.5	1.0	2.0

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*Sorbitol liquid contains 70% sorbitol, 30% water.

**Lecithin and SPEs can be pre-blended.

***Flavor and SPEs can be pre-blended.

TABLE 9

	<u>Ex. 44</u>	<u>Ex. 45</u>	<u>Ex. 46</u>	<u>Ex. 47</u>	<u>Ex. 48</u>
5					
	Base	25.5	25.5	25.5	25.5
	Sorbitol	50.95	50.7	50.4	52.0
	HSH Syrup*	10.0	10.0	10.0	10.0
	Mannitol	8.0	8.0	8.0	8.0
10	Glycerin**	4.0	4.0	4.0	2.0
	Flavor	1.5	1.5	1.5	1.5
	Lecithin***	---	0.1	0.1	---
	SPEs****	0.05	0.2	0.5	1.0

*Lycasin brand hydrogenated starch hydrolyzate syrup.

15 **Glycerin and HSH syrup may be blended or co-evaporated.

***Lecithin and SPEs can be pre-blended.

****Flavor and SPEs can be pre-blended.

Table 10 shows sugar chewing gum formulations that can be made with sucrose polyesters and various types of sugars.

TABLE 10

	<u>Ex. 49</u>	<u>Ex. 50</u>	<u>Ex. 51</u>	<u>Ex. 52</u>	<u>Ex. 53</u>	<u>Ex. 54</u>
	Gum Base	19.2	19.2	19.2	19.2	19.2
	Sucrose	49.4	48.5	44.4	43.5	34.4
25	Glycerin	1.4	1.4	1.4	1.4	1.4
	Corn Syrup	14.0	14.0	14.0	14.0	14.0
	Dextrose	5.0	5.0	---	---	10.0
	Lactose	5.0	5.0	10.0	10.0	---
	Fructose	5.0	5.0	10.0	10.0	10.0
30	Invert Sugar	---	---	---	---	10.0
	Maltose	---	---	---	---	---

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	Corn Syrup						
	Solids	---	---	---	---	---	---
	Peppermint						
	Flavor	0.9	0.9	0.9	0.9	0.9	0.9
5	SPEs	0.1	1.0	0.1	1.0	0.1	1.0
		<u>Ex. 55</u>	<u>Ex. 56</u>	<u>Ex. 57</u>	<u>Ex. 58</u>	<u>Ex. 59</u>	<u>Ex. 60</u>
	Gum Base	19.2	19.2	19.2	19.2	19.2	19.2
	Sucrose	34.4	43.5	34.4	43.5	42.4	46.5
10	Glycerin	1.4	1.4	1.4	1.4	1.4	1.4
	Corn Syrup	14.0	14.0	14.0	14.0	11.0	11.0
	Dextrose	10.0	5.0	10.0	5.0	10.0	5.0
	Lactose	---	---	---	---	---	---
	Fructose	10.0	5.0	10.0	5.0	5.0	5.0
15	Invert Sugar	10.0	10.0	---	---	5.0	5.0
	Maltose	---	---	10.0	10.0	---	---
	Corn Syrup						
	Solids	---	---	---	---	5.0	5.0
	Peppermint						
20	Flavor	0.9	0.9	0.9	0.9	0.9	0.9
	SPEs	0.1	1.0	0.1	1.0	0.1	1.0
		<u>Ex. 61</u>	<u>Ex. 62</u>				
	Gum Base	19.2	19.2				
25	Sucrose	42.4	36.5				
	Glycerin	6.4	6.4				
	Corn Syrup	11.0	11.0				
	Dextrose	5.0	5.0				
	Lactose						
30	Fructose	5.0	5.0				
	Invert Sugar	5.0	5.0				
	Maltose	---	---				

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	Corn Syrup		
	Solids	5.0*	10.0*
	Peppermint		
	Flavor	0.9	0.9
5	SPEs	0.1	1.0

*5-25DE maltodextrin can be used.

Table 11 shows chewing gum formulations that are free of sugar. These formulations can use a wide variety of other non-sugar alditols.

10

TABLE 11(WEIGHT PERCENT)

	<u>Ex. 63</u>	<u>Ex. 64</u>	<u>Ex. 65</u>	<u>Ex. 66</u>	<u>Ex. 67</u>	<u>Ex. 68</u>
	Gum Base	25.5	25.5	25.5	25.5	25.5
	Glycerin	2.0	2.0	2.0	2.0	2.0
15	Sorbitol	43.9	43.0	43.9	38.0	39.0
	Mannitol	—	10.0	10.0	10.0	6.0
	Sorbitol					
	Liquid	17.0	17.0	—	—	—
	Lycasin	—	—	17.0	12.0	10.0
20	Maltitol	10.0	—	—	10.0	—
	Xylitol	—	—	—	—	15.0
	Lactitol	—	—	—	—	—
	Palatinit	—	—	—	—	—
	Flavor	1.5	1.5	1.5	1.5	1.5
25	SPEs	0.1	1.0	0.1	1.0	1.0

TABLE 11 (Cont'd)(WEIGHT PERCENT)

	<u>Ex. 69</u>	<u>Ex. 70</u>	<u>Ex. 71</u>	<u>Ex. 72</u>	<u>Ex. 73</u>	<u>Ex. 74</u>
	Gum Base	25.5	25.5	25.5	25.5	25.5
30	Glycerin	8.0	8.0	8.0	2.0	0.0
	Sorbitol	41.9	36.0	31.9	40.0	26.9
	Mannitol	8.0	8.0	8.0	—	—

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	Sorbitol					
	Liquid	5.0	---	---	---	---
	Lycasin	---	5.0	5.0	5.0	10.0
	Maltitol	---	5.0	---	---	---
5	Xylitol	---	---	---	15.0	10.0
	Lactitol	10.0	10.0	10.0	---	---
	Palatinit	---	---	10.0	10.0	25.0
	Flavor	1.5	1.5	1.5	1.5	1.5
	SPEs	0.1	1.0	0.1	1.0	0.1
10	The following examples of the invention are also					
	shown in Table 12 for natural and synthetic gum bases					
	with wax, Table 13 for chewing gum bases that are wax-					
	free and have some reduced tack properties, Table 14 for					
	wax free bubble gum bases and Table 15 for wax-free gum					
15	bases having non-tack characteristics. These examples					
	illustrate how sucrose polyesters can be added to a wide					
	variety of chewing gum bases to partially replace some					
	of the oils, fats, and base softeners.					

TABLE 12

20 NATURAL AND SYNTHETIC BASES WITH WAX
 (WEIGHT PERCENT)

		<u>Ex. 75</u>	<u>Ex. 76</u>	<u>Ex. 77</u>
	Butyl Rubber	11.7	10.0	9.0
	Styrene Butadiene Rubber	---	---	---
25	Polyisobutylene	---	10.4	5.3
	Jelutong	---	---	---
	Ester Gum	14.8	---	---
	Terpene Resin	9.9	6.8	16.7
	Low MW Polyvinylacetate	21.2	23.2	24.6
30	High MW Polyvinylacetate	---	---	---
	Talc	---	---	---
	Calcium Carbonate	11.2	14.7	20.1

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	Acetylated Monoglyceride	--	--	--
	Hydrogenated Cotton Seed Oil	--	10.0	5.3
	Hydrogenated Soybean Oil	10.0	11.1	3.3
	Partially Hydrogenated Soybean and			
5	Palm Oil	--	2.3	--
	Partially Hydrogenated Cottonseed Oil	--	--	--
	SPEs	5.7	4.3	4.2
	Lecithin	2.7	--	0.8
	Glycerol Monostearate	3.8	4.1	2.2
10	Triacetin	--	--	--
	Microcrystalline Wax (MP 180°F)	6.0	3.1	8.5
	Paraffin Wax (MP 135°F)	<u>3.0</u>	<u>--</u>	<u>--</u>
		100.0	100.0	100.0
	<u>BUBBLE BASES</u>			
15		<u>Ex. 78</u>	<u>Ex. 79</u>	<u>Ex. 80</u>
	Butyl Rubber	--	--	2.5
	Styrene Butadiene Rubber	10.3	1.6	--
	Polyisobutylene	--	9.1	9.0
	Jelutong	--	--	--
20	Ester Gum	24.7	22.5	15.0
	Terpene Resin	--	--	--
	Low MW Polyvinylacetate	--	--	--
	High MW Polyvinylacetate	--	30.0	24.1
	Talc	--	--	25.4
25	Calcium Carbonate	56.8	21.7	--
	Acetylated Monoglyceride	--	--	4.0
	Hydrogenated Cotton Seed Oil	1.5	--	--
	Hydrogenated Soybean Oil	--	--	--
	Partially Hydrogenated Soybean and			
30	Palm Oil	--	2.0	--
	Partially Hydrogenated Cottonseed Oil	--	--	--
	SPEs	1.5	1.5	2.0

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	Lecithin	--	--	1.5
	Glycerol Monostearate	1.1	--	7.1
	Triacetin	--	4.5	3.2
	Microcrystalline Wax (MP 180°F)	--	--	1.2
5	Paraffin Wax (MP 135°F)	<u>4.1</u>	<u>7.1</u>	<u>5.0</u>
		100.0	100.0	100.0
		<u>Ex. 81</u>	<u>Ex. 82</u>	<u>Ex. 83</u>
	Butyl Rubber	6.8	6.8	8.8
10	Styrene Butadiene Rubber	--	--	--
	Polyisobutylene	3.0	3.2	4.1
	Jelutong	21.1	18.2	4.0
	Ester Gum	16.7	16.6	--
	Terpene Resin	--	--	17.3
15	Low MW Polyvinylacetate	16.6	16.1	25.0
	High MW Polyvinylacetate	--	--	--
	Talc	--	--	18.1
	Calcium Carbonate	13.2	19.7	--
	Acetylated Monoglyceride	--	--	--
20	Hydrogenated Cotton Seed Oil	2.3	--	4.5
	Hydrogenated Soybean Oil	--	3.2	2.7
	Partially Hydrogenated Soybean and Palm Oil	--	--	--
	Partially Hydrogenated Cottonseed Oil	--	2.0	--
25	SPEs	3.0	1.8	3.3
	Lecithin	--	--	--
	Glycerol Monostearate	2.1	4.5	4.1
	Triacetin	--	--	--
	Microcrystalline Wax (MP 180°F)	15.2	6.8	6.1
30	Paraffin Wax (MP 135°F)	<u>--</u>	<u>1.1</u>	<u>2.0</u>
		100.0	100.0	100.0

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		Ex. 84		
		Bubble		
		<u>Base</u>	<u>Ex. 85</u>	<u>Ex. 86</u>
5	Butyl Rubber	---	9.1	9.3
	Styrene Butadiene Rubber	---	---	---
	Polyisobutylene	8.0	3.5	10.5
	Jelutong	---	3.1	---
	Ester Gum	14.7	1.5	---
10	Terpene Resin	---	15.0	13.0
	Low MW Polyvinylacetate	---	22.8	23.0
	High MW Polyvinylacetate	34.5	---	---
	Talc	28.6	---	---
	Calcium Carbonate	---	23.0	14.9
15	Acetylated Monoglyceride	2.5	---	---
	Hydrogenated Cotton Seed Oil	---	4.6	8.0
	Hydrogenated Soybean Oil	---	2.9	5.2
	Partially Hydrogenated Soybean and Palm Oil	---	---	3.1
	Partially Hydrogenated Cottonseed Oil	---	---	1.5
20	SPEs	0.9	2.4	2.1
	Lecithin	---	0.8	---
	Glycerol Monostearate	4.4	2.8	4.5
	Triacetin	4.6	---	---
	Microcrystalline Wax (MP 180°F)	---	7.0	4.4
25	Paraffin Wax (MP 135°F)	<u>1.8</u>	<u>1.5</u>	<u>0.5</u>
		100.0	100.0	100.0

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		<u>Ex. 87</u>	<u>Ex. 88</u>	Ex. 89 Bubble <u>Base</u>
	Butyl Rubber	6.1	8.1	—
5	Styrene Butadiene Rubber	—	—	6.0
	Polyisobutylene	7.1	5.5	7.5
	Jelutong	—	—	—
	Ester Gum	—	7.1	12.2
	Terpene Resin	14.1	7.1	—
10	Low MW Polyvinylacetate	28.1	22.2	—
	High MW Polyvinylacetate	—	—	29.0
	Talc	—	—	28.9
	Calcium Carbonate	18.9	25.6	—
	Acetylated Monoglyceride	—	—	3.7
15	Hydrogenated Cotton Seed Oil	10.1	13.2	3.7
	Hydrogenated Soybean Oil	5.1	5.1	—
	Partially Hydrogenated Soybean and Palm Oil	—	—	—
	Partially Hydrogenated Cottonseed Oil	—	—	—
20	SPEs	4.1	4.1	1.3
	Lecithin	0.7	0.5	—
	Glycerol Monostearate	1.5	1.5	2.1
	Triacetin	—	—	1.2
	Microcrystalline Wax (MP 180°F)	3.1	—	4.4
25	Paraffin Wax (MP 135°F)	<u>1.1</u>	<u>—</u>	<u>—</u>
		100.0	100.0	100.0

**TABLE 13: WAX-FREE GUM BASES FOR USE IN CHEWING GUM
HAVING SOME REDUCED TACK CHARACTERISTICS
(EXAMPLES 90-119)**

EXAMPLES 90-94

5	IDENTIFICATION - EXAMPLES #:					
	GENERIC INGREDIENTS					
		90	91	92	93	94
	** SYNTHETIC ELASTOMER **					
10	STYRENE-BUTADIENE ELASTOMER	5.3	--	2.1	1.8	--
	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	8.6	7.9	7.2	--	8.1
15	POLYISOBUTYLENE ELASTOMER	7.1	--	7.4	24.8	3.6
	POLYVINYL ACETATE	10.5	27.2	15.3	10.1	27.3
20	** ELASTOMER PLASTICIZERS **					
	GLYCEROL ESTERS OF ROSIN	2.1	--	19.0	3.7	--
25	GLYCEROL ESTERS OF PART HYD ROSIN	4.3	18.2	--	7.9	--
	TERPENE RESINS	10.8	--	--	7.1	26.8
	** FILLER **					
30	CALCIUM CARBONATE	--	15.9	20.7	17.7	11.4
	TALC	25.5	--	--	--	--
35	** SOFTENER **					
	HYDROGENATED COTTONSEED OIL	--	6.0	--	7.0	--
40	HYDROGENATED SOYBEAN OIL	6.3	--	7.1	--	--
	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	3.3	--	7.0	--	9.1
45	PARTIALLY HYDROGENATED COTTONSEED OIL	--	8.3	--	8.0	--

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	SPEs	7.7	11.3	12.2	7.0	5.2
5	GLYCEROL MONOSTEARATE	6.2	4.4	2.0	2.5	4.8
	LECITHIN	2.3	0.8	—	2.4	3.7
10	TOTAL PERCENT	100.0	100.0	100.0	100.0	100.0

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EXAMPLES 95-97

5	IDENTIFICATION - EXAMPLES #: GENERIC INGREDIENTS	95	96	97
	** SYNTHETIC ELASTOMER **			
	STYRENE-BUTADIENE ELASTOMER	5.2	2.1	5.9
10	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	4.1	7.2	6.9
	POLYISOBUTYLENE ELASTOMER	5.9	7.3	2.0
15	POLYVINYL ACETATE	25.7	15.3	24.8
	** ELASTOMER PLASTICIZERS **			
	GLYCEROL ESTERS OF ROSIN	23.5	19.1	8.6
20	GLYCEROL ESTERS OF PART HYD ROSIN	--	--	8.0
	TERPENE RESINS	3.2	--	1.9
25	** FILLER **			
	CALCIUM CARBONATE	15.1	20.7	9.9
30	TALC	--	--	7.2
	** SOFTENER **			
	HYDROGENATED COTTONSEED OIL	--	--	7.0
35	HYDROGENATED SOYBEAN OIL	--	--	--
	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	5.5	8.3	5.0
40	PARTIALLY HYDROGENATED COTTONSEED OIL	3.0	10.6	--
	SPEs	3.7	6.4	10.0
45	GLYCEROL MONOSTEARATE	5.1	3.0	2.7
	LECITHIN	--	--	--
	TOTAL PERCENT	100.0	100.0	100.0

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EXAMPLES 98-101

5	IDENTIFICATION - EXAMPLES #: GENERIC INGREDIENTS	98	99	100	101
	** SYNTHETIC ELASTOMER **				
	STYRENE-BUTADIENE ELASTOMER	3.9	2.1	--	--
10	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	5.3	6.0	8.9	3.6
	POLYISOBUTYLENE ELASTOMER	12.7	8.5	10.0	11.1
15	POLYVINYL ACETATE	14.9	15.3	21.3	21.9
	** ELASTOMER PLASTICIZERS **				
	GLYCEROL ESTERS OF ROSIN	--	10.1	--	19.6
20	GLYCEROL ESTERS OF PART HYD ROSIN	--	8.9	--	11.2
	TERPENE RESINS	21.4	--	9.7	3.7
	** FILLER **				
25	CALCIUM CARBONATE	13.7	20.9	21.5	6.4
	TALC	1.4	--	--	--
30	** SOFTENER **				
	HYDROGENATED COTTONSEED OIL	--	4.2	--	5.0
	HYDROGENATED SOYBEAN OIL	1.7	--	5.0	--
35	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	5.7	2.0	--	10
	PARTIALLY HYDROGENATED COTTONSEED OIL	--	--	15.0	--
40	SPEs	17.0	20.0	3.2	4.2
	GLYCEROL MONOSTEARATE	--	2.0	5.4	3.3
45	LECITHIN	2.3	--	--	--
	TOTAL PERCENT	100.0	100.0	100.0	100.0

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EXAMPLES 102-106

	IDENTIFICATION - EXAMPLES #:	102	103	104	105	106
5	GENERIC INGREDIENTS					
	** SYNTHETIC ELASTOMER **					
	STYRENE-BUTADIENE ELASTOMER	--	3.2	4.1	--	--
10	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	7.4	7.3	11.3	10.0	8.3
	POLYISOBUTYLENE ELASTOMER	1.9	7.5	7.9	1.9	3.6
15	POLYVINYL ACETATE	24.8	21.1	18.2	27.6	27.5
	** ELASTOMER PLASTICIZERS **					
20	GLYCEROL ESTERS OF ROSIN	--	15.3	--	--	--
	GLYCEROL ESTERS OF PART HYD ROSIN	--	2.4	26.2	--	--
25	TERPENE RESINS	25.8	5.8	1.4	25.3	25.3
	** FILLER **					
	CALCIUM CARBONATE	18.6	--	13.6	11.3	11.3
30	TALC	--	14.8	--	--	--
	** SOFTENER **					
35	HYDROGENATED COTTONSEED OIL	4.0	4.4	3.2	--	3.0
	HYDROGENATED SOYBEAN OIL	--	--	--	2.4	4.0
40	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	--	5.0	--	--	4.2
	PARTIALLY HYDROGENATED COTTONSEED OIL	--	--	--	4.0	--
45	SPEs	10.3	11.4	7.0	13.0	8.3

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5

GLYCEROL MONOSTEARATE	2.4	1.8	3.2	0.8	1.8
LECITHIN	4.8	--	3.9	3.7	2.7
TOTAL PERCENT	100.0	100.0	100.0	100.0	100.0

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EXAMPLES 107-110

5	IDENTIFICATION - EXAMPLES #:				
	107	108	109	110	
	GENERIC INGREDIENTS				
	** NATURAL ELASTOMER **				
	NATURAL GUM	22.0	25.1	22.8	17.6
10	** SYNTHETIC ELASTOMER **				
	STYRENE-BUTADIENE ELASTOMER	--	1.9	2.6	--
15	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	4.8	2.1	4.1	10.2
	POLYISOBUTYLENE ELASTOMER	5.7	4.7	3.2	2.1
20	POLYVINYL ACETATE	16.4	24.8	16.3	26.9
	** ELASTOMER PLASTICIZERS **				
	GLYCEROL ESTERS OF ROSIN	3.8	3.2	6.9	11.3
25	GLYCEROL ESTERS OF PART HYD ROSIN	12.3	12.6	11.8	4.8
	METHYL ESTERS OF ROSIN	--	2.1	1.7	--
30	TERPENE RESINS	--	--	--	--
	** FILLER **				
35	CALCIUM CARBONATE	--	4.4	9.3	--
	TALC	7.1	--	--	4.6
	** SOFTENER **				
40	HYDROGENATED COTTONSEED OIL	--	--	10.0	--
	HYDROGENATED SOYBEAN OIL	5.0	--	--	5.6
45	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	11.0	12.0	3.7	8.0
	PARTIALLY HYDROGENATED COTTONSEED OIL	5.0	--	--	--

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	SPEs	0.8	0.6	4.5	5.6
5	GLYCEROL MONOSTEARATE	6.1	3.8	--	3.3
	LECITHIN	--	2.7	3.1	--
10	TOTAL PERCENT	100.0	100.0	100.0	100.0

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EXAMPLES 111-114

	IDENTIFICATION - EXAMPLES #:	111	112	113	114
5	GENERIC INGREDIENTS				
	** NATURAL ELASTOMER **				
	NATURAL GUM	15.7	22.6	22.2	21.1
10	** SYNTHETIC ELASTOMER **				
	STYRENE-BUTADIENE ELASTOMER	1.9	--	--	--
15	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	3.7	5.8	5.7	6.1
	POLYISOBUTYLENE ELASTOMER	4.1	3.1	3.1	2.8
20	POLYVINYL ACETATE	26.2	20.4	22.0	18.0
	** ELASTOMER PLASTICIZERS **				
	GLYCEROL ESTERS OF ROSIN	--	--	--	15.7
25	GLYCEROL ESTERS OF PART HYD ROSIN	15.3	11.7	15.2	--
	METHYL ESTERS OF ROSIN	--	4.0	--	--
30	TERPENE RESINS	--	--	--	--
	** FILLER **				
35	CALCIUM CARBONATE	12.2	11.6	11.4	--
	TALC	--	--	--	15.4
	** SOFTENER **				
40	HYDROGENATED COTTONSEED OIL	--	2.0	--	9.1
	HYDROGENATED SOYBEAN OIL	3.0	--	6.2	--
45	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	--	15.0	--	2.0
	PARTIALLY HYDROGENATED COTTONSEED OIL	12.0	--	6.0	--

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	SPEs	0.1	0.5	4.9	6.0
5	GLYCEROL MONOSTEARATE	5.8	3.3	3.3	3.8
	LECITHIN	--	--	--	--
10	TOTAL PERCENT	100.0	100.0	100.0	100.0

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EXAMPLES 115-119

5	IDENTIFICATION - EXAMPLES #: GENERIC INGREDIENTS	115	116	117	118	119
	** NATURAL ELASTOMER **					
	NATURAL GUM	23.8	18.7	14.4	18.2	25.2
10	** SYNTHETIC ELASTOMER **					
	STYRENE-BUTADIENE ELASTOMER	--	--	--	--	--
15	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	3.1	6.0	9.1	6.8	2.4
	POLYISOBUTYLENE ELASTOMER	7.7	5.5	3.6	5.4	4.9
20	POLYVINYL ACETATE	20.5	14.8	18.1	15.5	19.9
	** ELASTOMER PLASTICIZERS **					
25	GLYCEROL ESTERS OF ROSIN	--	--	11.9	--	15.6
	GLYCEROL ESTERS OF PART HYD ROSIN	10.4	15.5	13.0	12.7	--
	METHYL ESTERS OF ROSIN	2.0	--	--	2.6	--
30	TERPENE RESINS	5.1	--	--	--	2.1
	** FILLER **					
35	CALCIUM CARBONATE	--	18.8	14.1	15.7	--
	TALC	5.3	--	--	--	7.1
	** SOFTENER **					
40	HYDROGENATED COTTONSEED OIL	--	8.5	7.0	--	--
	HYDROGENATED SOYBEAN OIL	8.9	--	--	6.0	10.0
45	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	--	--	2.0	--	--
	PARTIALLY HYDROGENATED COTTONSEED OIL	--	--	--	6.0	2.0

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	SPEs	7.9	6.5	6.8	5.0	8.4
5	GLYCEROL MONOSTEARATE	5.3	5.7	--	6.1	2.4
	LECITHIN	--	--	--	--	--
10	TOTAL PERCENT	100.0	100.0	100.0	100.0	100.0

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**TABLE 14: WAX-FREE GUM BASES FOR USE IN BUBBLE GUM
(EXAMPLES 120-128)**

5

EXAMPLES 120-123

IDENTIFICATION - EXAMPLES #:

120

121

122

123

GENERIC INGREDIENTS

10

** SYNTHETIC ELASTOMER **

POLYISOBUTYLENE ELASTOMER

17.1

11.7

11.6

5.4

POLYVINYL ACETATE

24.9

29.4

31.5

34.8

15

** ELASTOMER PLASTICIZERS **

GLYCEROL ESTERS OF ROSIN

6.8

10.7

19.8

16.3

20

GLYCEROL ESTERS OF PART
HYD ROSIN

--

--

--

--

** FILLER **

25

CALCIUM CARBONATE

--

--

--

30.2

TALC

34.7

34.1

21.9

--

** SOFTENER **

30

SPEs

1.1

3.4

3.0

2.0

GLYCEROL TRIACETATE

4.6

4.4

5.0

5.3

35

GLYCEROL MONOSTEARATE

5.8

4.3

4.9

3.9

ACETYLATED MONOGLYCERIDE

5.0

2.0

2.3

2.1

TOTAL PERCENT

100.0

100.0

100.0

100.0

40

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EXAMPLES 124-128

	IDENTIFICATION - EXAMPLES #:				
	124	125	126	127	128
5	GENERIC INGREDIENTS				
	** SYNTHETIC ELASTOMER **				
	POLYISOBUTYLENE ELASTOMER	7.9	13.0	7.9	11.6 11.8
10	POLYVINYL ACETATE	34.2	37.1	34.2	37.8 35.6
	** ELASTOMER PLASTICIZERS **				
15	GLYCEROL ESTERS OF ROSIN	14.8	--	--	--
	GLYCEROL ESTERS OF PART HYD ROSIN	--	19.8	14.8	19.8 19.8
20	** FILLER **				
	CALCIUM CARBONATE	29.8	16.5	29.8	-- --
	TALC	--	--	--	17.0 19.7
25	** SOFTENER **				
	SPEs	1.0	3.5	3.0	2.6 0.8
30	GLYCEROL TRIACETATE	5.3	5.6	4.3	3.0 4.0
	GLYCEROL MONOSTEARATE	4.0	4.5	3.0	3.2 2.3
	ACETYLATED MONOGLYCERIDE	3.0	--	3.0	5.0 6.0
35	TOTAL PERCENT	100.0	100.0	100.0	100.0 100.0

**TABLE 15: WAX-FREE GUM BASES FOR USE IN CHEWING GUM
HAVING NON-TACK CHARACTERISTICS (EXAMPLES 129-
140)**

5	<u>EXAMPLES 129-134</u>						
	IDENTIFICATION - EXAMPLES #:	129	130	131	132	133	134
	GENERIC INGREDIENTS						
10	** SYNTHETIC ELASTOMER **						
	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	--	--	--	25.0	9.0	14.1
15	POLYISOBUTYLENE	35.0	17.0	20.0	--	16.9	12.1
	POLYVINYL ACETATE	--	17.0	30.0	5.0	22.8	20.8
20	** FILLER **						
	CALCIUM CARBONATE	25.0	40.0	5.0	25.0	--	13.9
	TALC	--	--	--	--	12.0	--
25	** SOFTENERS **						
	HYDROGENATED SOYBEAN OIL	5.0	--	15.0	--	14.8	7.7
30	HYDROGENATED COTTONSEED OIL	--	8.0	--	15.0	14.0	10.0
	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	20.0	2.0	--	17.0	--	7.0
35	PARTIALLY HYDROGENATED COTTON- SEED OIL	3.0	--	10.0	--	--	7.7
	SPEs	5.0	8.0	5.0	10.0	8.8	4.0
40	GLYCEROL MONOSTEARATE	7.0	--	5.0	2.0	1.7	2.7
	LECITHIN	--	8.0	--	--	--	--

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EXAMPLES 135-140

	IDENTIFICATION - EXAMPLES #:	135	136	137	138	139	140
5	GENERIC INGREDIENTS						
	** SYNTHETIC ELASTOMER **						
10	BUTYL (ISOPRENE-ISOBUTYLENE) ELASTOMER	16.0	9.9	9.9	10.0	10.0	13.3
	POLYISOBUTYLENE	10.0	15.5	15.5	15.9	15.9	21.2
	POLYVINYL ACETATE	14.0	22.0	22.0	21.7	21.6	29.1
15	** FILLER **						
	CALCIUM CARBONATE	5.0	12.9	12.9	13.3	---	17.7
20	TALC	10.0	---	---	---	13.1	---
	** SOFTENERS **						
	HYDROGENATED SOYBEAN OIL	---	14.0	9.0	3.3	13.5	6.1
25	HYDROGENATED COTTONSEED OIL	---	13.0	13.0	3.3	13.5	6.1
	PARTIALLY HYDROGENATED SOYBEAN AND PALM OIL	5.0	---	10.0	---	---	2.0
30	PARTIALLY HYDROGENATED COTTON- SEED OIL	---	---	---	9.8	---	---
	SPEs	35.0	10.0	5.0	20.0	9.8	3.2
35	GLYCEROL MONOSTEARATE	---	2.7	1.7	2.7	2.6	1.3
	LECITHIN	---	---	1.0	---	---	---

40 It should be understood that various changes and
modifications to the presently preferred embodiments
described herein will be apparent to those skilled in the
art. Such changes and modifications can be made without
departing from the spirit and scope of the present
45 invention and without diminishing its attendant

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advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

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WE CLAIM:

1. A gum base comprising:
an elastomer; and
at least 0.02% by weight sucrose polyesters.
- 5 2. The gum base of Claim 1 wherein the base is wax-free.
3. The gum base of Claim 1 wherein the base is non-tacky.
- 10 4. The gum base of Claim 1 wherein the base is a bubble gum-type base.
5. The gum base of Claim 1 including at least one resin.
- 15 6. The gum base of Claim 1 including at least one softener chosen from the group consisting of: tallow; hydrogenated tallow; hydrogenated and partially hydrogenated vegetable oils; cocoa butter; glycerol monostearate; glycerol triacetate; and lecithin.
- 20 7. The gum base of Claim 1 wherein the sucrose polyesters comprise not more than 40% by weight of the base.
8. A chewing gum formulation comprising:
an insoluble gum base;
a water soluble portion;
a flavor; and
25 at least 0.01% by weight sucrose polyesters.
9. The chewing gum formulation of Claim 8 including at least one softener chosen from the group consisting of: tallow; hydrogenated tallow; hydrogenated and partially hydrogenated vegetable oils; cocoa butter; glycerol monostearate; glycerol triacetate; and lecithin.
- 30 10. The chewing gum formulation of Claim 8 wherein the sucrose polyesters comprise not more than 5% by weight of the chewing gum formulation.

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11. The chewing gum formulation of Claim 8 wherein the formulation includes a bulk sweetener.

12. The chewing gum formulation of Claim 8 wherein the formulation includes a high intensity sweetener.

5 13. The chewing gum formulation of Claim 8 wherein the formulation includes an emulsifier.

14. The chewing gum formulation of Claim 8 wherein the formulation includes an elastomer plasticizer.

10 15. The chewing gum formulation of Claim 8 wherein the formulation includes an elastomer.

16. The chewing gum formulation of Claim 8 wherein the formulation includes lecithin.

15 17. A method for creating chewing gum comprising the step of substituting for a typical plasticizer, softener, or emulsifier in a chewing gum formulation sucrose polyesters.

18. The method of Claim 17 wherein the sucrose polyesters comprise approximately 0.01% to about 5% by weight of the chewing gum formulation.

20 19. A gum base comprising:

an elastomer; and

at least 0.02% by weight of sucrose fatty acid esters chosen from the group consisting of hexa-, hepta- and octa- fatty acids.

25 20. The gum base of Claim 19 wherein the sucrose fatty acid esters are chosen from the group consisting of: sucrose octapalmitate, sucrose octastearate, and sucrose octaoleate.

30 21. A chewing gum formulation comprising:
an insoluble gum base;
a water soluble portion;
a flavor; and

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at least 0.01% by weight of a sucrose fatty acid esters chosen from the group consisting of hexa-, hepta- and octa- fatty acids.

5 22. The gum base of Claim 21 wherein the sucrose fatty acid esters are chosen from the group consisting of: sucrose octapalmitate, sucrose octastearate, and sucrose octaoleate.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/07826

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A23G 3/30

US CL :426/3

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 426/3, 4, 5, 6

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

search terms: chewing gum, sucrose polyester

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,983,404 (RAMAN ET AL) 08 January 1991.	1-22
A	US, A, 4,933,190 (CHERUKURI ET AL) 12 June 1990.	1-22
A	US, A, 5,057,328 (CHERUKURI ET AL) 15 October 1991.	1-22

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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* P* document published prior to the international filing date but later than the priority date claimed		

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